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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/682,699	10/05/2001	Jean Helen Brittain	GEMS8081.060	1546
27061	7590	03/19/2004	EXAMINER	
ZIOLKOWSKI PATENT SOLUTIONS GROUP, LLC (GEMS)			FETZNER, TIFFANY A	
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MEQUON, WI 53097			PAPER NUMBER	

2859

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Please find below and/or attached an Office communication concerning this application or proceeding.

<p align="center">Office Action Summary</p>	Application No. 09/682,699	Applicant(s) BRITTAİN, JEAN HELEN	
	Examiner Tiffany A Feltzner	Art Unit 2859	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 December 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 and 16-30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-12 and 16-21 is/are allowed.
- 6) ☒ Claim(s) 22-30 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 October 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input checked="" type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. <u>03/05/2004</u> |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED Final ACTION

Response to Arguments

1. The applicant's arguments concerning the **Kruger et al.**, reference of December 15th 2003 have been considered, but in view of the acceptable, persuasive declaration under 37 CFR 1.131 which swears behind the effective date of the reference, the arguments are considered by the examiner to be moot.
2. Applicant's arguments concerning the 112 rejection of claim 30, [See the December 15th 2003 response page 8 paragraph 4 through page 11 paragraph 1], have been considered but are not persuasive because applicant's claim 22 from which claim 30 depends does not positively recite a "slab thickness". An examiner's suggestion on how to correct this problem follows the maintained rejection below.
3. In view of applicant's December 15th 2003 arguments concerning the **102 (f)** rejection of **claims 1-30**, on page 11 paragraphs 2, 3, and 4 of the December 15th 2003 amendment and response. The **35 USC 102 (f)** rejection of **claims 1-30** is withdrawn.
4. In view of applicant's August 28th 2003 arguments concerning the **Dietrich et al.**, article "Extending the coverage of true volume scans by continuous movement of the subject" by Olaf Dietrich and Joseph V. Hajnal from The Robert Steiner Magnetic Resonance Unit, Hammersmith Hospital, Du Cane Road, London W120HS 1999. The arguments are persuasive and therefore the **Dietrich et al.**, article is no longer being applied by the examiner as prior art against the claims of applicant's invention.
5. Applicant's argument for reconsideration of the declaration accompanying the response of April 18th 2003 is persuasive, and upon further review of the declaration,

the declaration submitted with the April 18th 2003 response is now considered to be acceptable and to satisfy the requirements of 37 CFR 1.131 (b); because paragraph 3 on page one of the declaration states that the applicant *conceived of the invention "prior to September 21st 2001"*.

6. The arguments presented on page 5 of the April 18th 2003 amendment response concerning the **Yoshitome H6-311977** reference is persuasive therefore the rejection of **claim 1** for this reference has been rescinded.

7. The examiner notes that all **previous prior-art rejections have been overcome** by applicant's arguments and the effective declarations, therefore only the prior art rejections given below which are **final** based on applicant's December 15th 2003 amendment remain as art issues in the instant application.

Response to Amendment

8. The declaration filed on **December 15th 2003** under 37 CFR 1.131 has been considered as per applicant December 15th 2003 amendment request and is upon further review effective to overcome the **Kruger et al.**, reference, therefore the **Kruger et al.**, reference is no longer available or applicable as prior art against the claims of applicant's invention, because applicant has sworn behind the **35 USC 102 (e)** effective date of April 9th 2001 for the **Kruger et al.**, reference. Therefore all the rejections, arguments and issues concerning the instant application and the **Kruger et al.**, reference are considered to be moot by the examiner.

9. In response to applicant's request for a copy of the **Kruger et al.**, reference's provisional application 60/282555, as a means of verification of the **Kruger et al.**, reference's date of April 9th 2001, [See applicant's December 15th amendment remarks on page 11 the last paragraph through page 12 paragraph 2, where applicant states that the Affidavit under 37 CFR 1.131 and MPEP 715 antedates the **Kruger et al.**, reference.] A courtesy copy, of **Kruger et al.**, provisional application 60/282555, according to the USPTO procedural Memorandum of December 10th 2003 is attached to this office action. The provisional application has also been noted in the general reference of record section of the examiner's notice of references cited.

10. The declaration filed on April 18th 2003 under 37 CFR 1.131 has been reconsidered as per applicant August 28th 2003 amendment request and is upon further review effective to overcome the **Machida** reference, therefore the **Machida** reference is no longer available or applicable as prior art against the claims of applicant's invention.

Canceled Claims

11. **Claims 13 –15** are canceled as per applicant's December 15th 2003 amendment response.

Drawings

12. The objections to **Figures 1-7** from the February 13th 2003 office action, that **Figures 1-7** should be designated by a legend such as --Prior Art-- are **rescinded** in view of applicant's April 18th 2003 response.

Provisional Double Patenting Maintained

Art Unit: 2859

13. **Claims 1,5, 6, 7, 8, 10, 12-15, 16-18, 20, 22, 24-26 and 29** of this application still conflict with pending **claims 1, 10-14, 16-18, 21, 24, 30, 39** of Application No.

10/235,454. 37 CFR 1.78(b) provides that when two or more applications filed by the same applicant contain conflicting claims, elimination of such claims from all but one application may be required in the absence of good and sufficient reason for their retention during pendency in more than one application. Applicant is required to either cancel the conflicting claims from all but one application or maintain a clear line of demarcation between the applications. See MPEP § 822.

14. **Claims 1,5, 6, 7, 8, 10, 12-15, 16-18, 20, 22, 24-26 and 29** are still provisionally rejected under the judicially created doctrine of double patenting over **claims 1, 10-14, 16-18, 21, 24, 30, 39** of copending Application No. 10/235,454. This is a provisional double patenting rejection since the conflicting claims have not yet been patented.

15. The subject matter claimed in the instant application is fully disclosed in the referenced copending application and would be covered by any patent granted on that copending application since the referenced copending application and the instant application are claiming common subject matter, as follows:

A) "A method of imaging large volumes without resulting slab-boundary artifacts comprising: defining a desired FOV larger than an optimal imaging volume of an MR scanner;

B) selecting a slab thickness in a first direction that is smaller than the desired FOV and within the optimal imaging volume of the MR scanner; and

C) continuously moving one of the optimal imaging volume and an imaging object in the first direction while repeatedly exciting and encoding spins with readout in the first direction to acquire data that is restricted to the selected slab thickness until at least one image of the FOV can be reconstructed." Each of these limitations are claimed in the independent claims of copending Application No. 10/235,454. There are also some dependent features, which overlap. The provisional double patenting is from the 09/682,699 application to the copending Application No. 10/235,454. Furthermore, since the Application No. 10/235,454 is a continuation of the instant 09/682,699 application there is no apparent reason why applicant would be prevented from presenting claims corresponding to those of the instant application in the other copending application.

Terminal disclaimer will not resolve the Provisional Double patenting Issue

16. The examiner contacted applicant's attorney on October 23rd, 2003; October 27th 2003; and October 29th 2003, to request a terminal disclaimer to overcome the issue of provisional double patenting between the instant application, and the continuation of this application (i.e. co-pending US application 10/235,454) the examiner was informed, by applicant's attorney J. Mark Wilkinson Reg. No. 48,865 that the instant application, and the co-pending US application 10/235,454, which share **Jean Helen Brittain** as an inventor are not commonly owned and are not commonly assigned. Therefore, the issue of non-statutory obvious provisional double patenting is an outstanding issue in this application. The examiner notes that because the two co-pending applications which share a common inventor are not commonly owned and are not commonly assigned that a terminal disclaimer cannot be filed to overcome the rejection.

Claim objections

17. **Claims 1**, and **16** are objected to because of the following informalities: the amended feature added to **claim 1**, and **16** was added one step to early creating an improper antecedent basis. The examiner suggests correcting the problem by making the corrections shown below.

A) With respect to objected to **Amended Claim 1**, (i.e. the underlined and bracketed proposed corrections correspond to the examiner's recommendations to correct the antecedent basis problem) "A method of imaging large volumes without resulting slab-boundary artifacts comprising:

defining a desired FOV larger than an optimal imaging volume of an MR scanner;

[enabling readout in ~~the~~ first direction]

selecting a slab thickness in a first direction that is smaller than the desired FOV and within the optimal imaging volume of the MR scanner;

enabling readout in the first direction and

continuously moving one of the optimal imaging volume and an imaging object in the first direction while repeatedly exciting and encoding spins with readout in the first direction to acquire data that is restricted to the selected slab thickness until at least one image of the FOV can be reconstructed".

B) With respect to objected to **Amended Claim 16**, (i.e. the underlined and bracketed proposed corrections correspond to the examiner's recommendations to correct the antecedent basis problem) "An MRI apparatus to acquire multiple sets of MR data with a moving table and reconstruct MR images without slab-boundary artifacts comprising:

a magnetic resonance imaging (MRI) system having a plurality of gradient coils positioned about a bore of a magnet to impress a polarizing magnetic field, and an RF transceiver system and an RF switch controlled by a pulse module to transmit RF signals to an RF coil assembly to acquire MR images;

a patient table movable fore and aft in the MRI system about the magnet bore;
and

a computer programmed to:

receive input defining a desired FOV larger than an optimal imaging volume of the MRI system;

define a fixed slab with respect to the magnet to acquire MR data,
define readout in a [the] first direction;

acquire full MR data with frequency encoding in a direction of table motion, defined as z-direction, for a selected subset of the MR data acquired in at least one transverse dimension in the fixed slab;

continuously move the patient table while maintaining position of the fixed slab;

determine patient table position; and

repeat the acquire and determine acts while the patient table is moving until an MR data set is acquired across the desired FOV to reconstruct an image of the FOV". Appropriate correction is required.

C) Claims 2-12 and 17-21 are objected to because they depend from **claims 1 and 16** respectively.

Claim Rejections - 35 USC § 112

18. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

19. **Claim 30** still recites the limitation "selecting a larger slab thickness than that used for imaging" in lines 2 and 3. There is still insufficient antecedent basis for this limitation in the claim.

20. **Claim 30 is still rejected** to because there is no antecedent basis support for the limitation of "selecting a larger slab thickness than that used for imaging", because **claim 22** does not recite a slab thickness used for imaging. Specifically the term "slab thickness" is not positively recited in **claim 22**, there for the limitation of "selecting a larger slab thickness than that used for imaging", and "repetitiously acquiring MR data for the larger slab thickness" lacks proper antecedent basis. The examiner proposes that applicant could correct this problem by amending **claim 22** to recite "a slab thickness", in combination with whichever limitation applicant deems appropriate, and amending claim 30 to recite "selecting a larger slab thickness than that used in claim 22."

Claim Rejections - 35 USC § 103

21. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

22. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

23. **Amended Claims 22-30** are rejected under **35 U.S.C. 103(a)** as being unpatentable over **Hajnal** US patent 6,385,478 B1 issued May 7th 2002, filed December 21st 1999.

24. With respect to **Amended Claim 22**, **Hajnal** teaches, shows and suggests "computer program to control a medical image scanner "[See figure 9, col. 3 line 50 through col. 4 line 3; where the architecture of the data processing circuitry is interpreted as intrinsically having a computer program in control of the medical MRI scanner of **Hajnal** as well as the order of the data processing , of the **Hajnal** medical MRI scanner because conventionally all medical image scanners are computer program controlled due to the amount of calculations and the speed at which the different components are activated/deactivated as necessary.] **Hajnal** also teaches, shows and suggests the ability to "create images across scanning boundaries without boundary artifacts" [See col. 6 lines 43-51; col. 1 lines 5-10; abstract; col. 1 line 53 through col. 3 line 39; and col. 5 line 51 through col. 6 line 42] From the teachings concerning the data processing circuitry it would have been obvious to one of ordinary skill in the art at the time that the invention was made that, the intrinsic computer program has "a set of instructions to control a computer" (i.e. the digital signal processor component 12 of figure 9 which controls components 6, 8, 9, 10, 11, 7, and 14 of figure 9). **Hajnal** also teaches that the architecture of the data processing circuitry, [See figure 9, col. 3 line 50 through col. 4 line 3]; "controls the computer" (i.e. DSP components 12 and 13 in figure 9).

25. **Hajnal** lacks directly teaching the term "field of view, or FOV, however as is well known a 'field of view' in medical imaging scanner is the area that is visible in a particular scan, and **Hajnal** teaches providing a volumetric image, of a region of interest of an object / patient / subject as a patient couch moves continuously through an a

magnetic resonance imaging apparatus.[See abstract, figures 1 through 4] Therefore It would have been obvious to one of ordinary skill in the art at the time that the invention was made that the **Hajnal** reference does suggest a “field of view” (i.e. an area of a visible image) even though an explicit statement of the term ‘field of view’ is lacked by the reference, because the volumetric images of **Hajnal** produce visible images, with the intrinsic area or three dimensional volume, constituting the intrinsic “field of view, or FOV”.

26. **Hajnal** also teaches providing a volumetric image that is larger than a restricted region of a main magnetic field, and forming a volumetric image of greater length than that of the restricted region” [See col. 1 lines 8-10; col. 2 lines 27-28] and that the volume to be imaged (i.e. the patient / object / subject) extends further than the slab of figure 4, [See col. 5 lines 62-63]. These teachings suggest that the volumetric image produced, with its intrinsic “field of view, or FOV, necessarily “span an area greater than a predefined optimal imaging area” (i.e. the region of good field, **Hajnal** components 4, and 5 in **Hajnal** figures 1, 2, 3, and 8, are interpreted by the examiner as “a predefined optimal imaging area” because according to **Hajnal** col. 2 lines 1-16; the region of good field is defined by the MRI apparatus itself) “of the medical image scanner;” [See col. 2 lines 1-16; figures 1, 2, 3, and 8]

27. **Hajnal** teaches the amended feature of “defining readout in **the** first direction” [See Figure 5d where **Hajnal** defines the Gy direction as the frequency encoding readout direction; and col. 4 lines 4-38]

28. **Hajnal** also teaches, and suggests the step of “applying an RF pulse to excite a region in at least a first direction” (i.e. a z direction. or the x and y directions based on the teachings of col. 7 lines 11-25) [See figure 5a; col. 3 line 41 through col. 7 line 30 in general] “in the selected FOV” [See **Hajnal** figures 5a and 5b in combination; col. 3 line

56 through col. 4 line 68] “apply magnetic field gradients to encode the region in the first direction;” [See **Hajnal** figures 5a, 5b, 5c, and 5d in combination; col. 3 line 56 through col. 7 line 30] “acquire k-space data in the first direction for a subset of at least one additional direction;” [See **Hajnal** figures 6a, 6b, and 7a through 7d; col. 4 line 4 through col. 7 line 25] “continuously reposition the predefined optimal imaging area with respect to an imaging object without interruption of motion;” [See **Hajnal** abstract; col. 2 lines 19-51; col. 3 line 41 through col. 7 line 30] “track continuous movement of the predefined optimal imaging area with respect to an imaging object;” [See **Hajnal** col. 5 line 1 through col. 7 line 30] “and repeat the image data acquisition during continuous movement of the predefined optimal imaging area with respect to an imaging object until complete image data are acquired across the entire FOV to reconstruct an image of the FOV”. [See **Hajnal** abstract; col. 2 lines 19-51; col. 3 line 41 through col. 7 line 30; figures 5a through 9].

29. With respect to **Claim 25**, **Hajnal** teaches, shows and suggests “continuously moving a patient table for a number of acquisitions until a set of k space data are acquired for image reconstruction of a given slab.” [See **Hajnal** col. 2 lines 19-51; col. 3 line 41 through col. 7 line 30; Figures 1 through 9; and the abstract] The same reasons for rejection, and obviousness that apply to **claim 22** also apply to **claim 25** and need not be reiterated.

30. With respect to **Amended Claim 26**, **Hajnal** teaches, “The k-space data includes MR data” because the k-space data of **Hajnal** is k-space MR data. [See abstract; col. 2 lines 19-28; col. 4 line 43 through col. 7 line 26; Figures 1 through 9] **Hajnal** also teaches, “Fourier transforming image data in z;” [See **Hajnal** col. 4 line 52 through col. 7 line 30; Figures 6a through 9] **Hajnal** also teaches, “sorting and aligning” (i.e. k-space regridding” of col. 7 lines 18-26) “the z-transformed MR data to match anatomic

locations in z to fill a matrix.” [See **Hajnal** col. 4 line 52 through col. 7 line 30; Figures 6a through 9] The same reasons for rejection, and obviousness that apply to **claims 1, 16, 22** also apply to **claim 26** and need not be reiterated.

31. With respect to **Claim 27**, **Hajnal** teaches, shows and suggests “maintaining a position of a slab thickness fixed, relative to a magnet of the medical image scanner, during the imaging of the desired FOV and while repositioning the optimal imaging area” [See **Hajnal** col. 2 line 19 through col. 7 line 30; Figures 1 through 9] The same reasons for rejection, and obviousness that apply to **claim 22** also apply to **claim 27** and need not be reiterated.

32. With respect to Amended **Claim 28**, **Hajnal** teaches, that “the k-space data includes MR data” because the k-space data of **Hajnal** is k-space MR data. [See abstract; col. 2 lines 19-28; col. 4 line 43 through col. 7 line 26; Figures 1 through 9] **Hajnal** also teaches, shows and suggests that “the first direction is a z direction” [See figures 5a and 5b where the slice select pulse is applied first along the z-axis;] “and the MR data acquired in the z-direction is represented in a number of retained ‘pixels’, (i.e. the z-coordinates of the **Hajnal** reference in col. 5 line 52 through col. 7 line 30] “and where MR data is acquired every sequence repetition and during table movement, and wherein the magnetic field gradients encode a trajectory that is uniform in kz”. [See **Hajnal** col. 2 line 19 through col. 7 line 30.] The same reasons for rejection, and obviousness that apply to **claim 22** also apply to **claim 28** and need not be reiterated.

33. With respect to **Claim 29**, **Hajnal** teaches, shows and suggests “acquiring all kz data for a selected subset of transverse k-space; defining a set of magnetic field gradient waveforms to incrementally acquire data in each slab; and applying the set of magnetic field gradient waveforms over each slab.” [See **Hajnal** col. 2 line 19 through

col. 7 line 30; Figures 1 through 9.] The same reasons for rejection, and obviousness that apply to **claim 22** also apply to **claim 29** and need not be reiterated.

34. With respect to **Amended Claim 30**, **Hajnal** teaches that “the k-space data includes MR data” because the k-space data of **Hajnal** is k-space MR data. [See abstract; col. 2 lines 19-28; col. 4 line 43 through col. 7 line 26; Figures 1 through 9] **Hajnal** also teaches, and suggests that the computer functions to “select a larger slab thickness than that used for imaging;” [See **Hajnal** col. 5 line 52 through col. 7 line 30] “repetitiously acquire MR data for the larger slab thickness in the direction of table movement;” [See **Hajnal** col. 3 line 41 through col. 7 line 17, where the series of steps is taught mainly for slabs in the z-direction (i.e. the z-direction is the direction of table motion in the **Hajnal** reference. ‘determine a set of overlapping data;” [See **Hajnal** col. 6 lines 6-51] “and estimate at least one of table velocity and table position from the set of overlapping MR data.” [See **Hajnal** col. 6 lines 6-42] The same reasons for rejection, and obviousness that apply to **claims 22** also apply to **claim 30** and need not be reiterated.

Allowable Subject Matter

35. **Claim 23** is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

36. With respect to **Claim 23**, **Hajnal** teaches, shows and suggests “the k-space data includes either one of 2D or 3D k-space data” [See **Hajnal** col. 1 lines 25-28; col. 1 lines 35-62; figures 6a, 6b, 8, and 4] **Hajnal** lacks teaching showing or suggesting the step of “acquiring the k space data using frequency encoding in a direction of table movement”, because the **Hajnal** reference teaches “acquiring the k space data using

frequency encoding in a direction of" phase encoding [See **Hajnal** col. 4 lines 4-67; and the phase encoding direction is transverse / orthogonal / perpendicular to the direction of table motion of **Hajnal** (i.e. in **Hajnal** the z-axis is the direction of table motion).

Therefore the teachings of **Hajnal** teach away from applicant's claimed limitation.

37. With respect to the objected to, but otherwise allowable, **Amended Claim 1**, (i.e. the underlined and bracketed proposed corrections correspond to the examiner's recommendations to correct the antecedent basis problem) "A method of imaging large volumes without resulting slab-boundary artifacts comprising:

defining a desired FOV larger than an optimal imaging volume of an MR scanner;

[enabling readout in the first direction]

selecting a slab thickness in a first direction that is smaller than the desired FOV and within the optimal imaging volume of the MR scanner;

enabling readout in the first direction and

continuously moving one of the optimal imaging volume and an imaging object in the first direction while repeatedly exciting and encoding spins with readout in the first direction to acquire data that is restricted to the selected slab thickness until at least one image of the FOV can be reconstructed".

38. This objected to **Amended Claim 1**, if rewritten as suggested by the examiner above, so that the steps have proper antecedent basis, is considered to be allowable over the prior art of record because the prior art does not teach or suggest the feature of **continuously moving one of the optimal imaging volume and an imaging object in the first direction while repeatedly exciting and encoding spins with readout in**

the first direction to acquire data that is restricted to the selected slab thickness until at least one image of the FOV can be reconstructed", in combination with each of the other features of the claim.

39. **Claims 2-12** are considered to be allowable over the prior art of record because they each depend from **allowable Amended claim 1**. Therefore, the same reasons for allowance that apply to **allowable amended claim 1** apply to **dependent claims 2-12** and need not be reiterated.

40. With respect to objected to **Amended Claim 16**, (i.e. the underlined and bracketed proposed corrections correspond to the examiner's recommendations to correct the antecedent basis problem) "An MRI apparatus to acquire multiple sets of MR data with a moving table and reconstruct MR images without slab-boundary artifacts comprising:

a magnetic resonance imaging (MRI) system having a plurality of gradient coils positioned about a bore of a magnet to impress a polarizing magnetic field, and an RF transceiver system and an RF switch controlled by a pulse module to transmit RF signals to an RF coil assembly to acquire MR images;

a patient table movable fore and aft in the MRI system about the magnet bore;
and

a computer programmed to:

receive input defining a desired FOV larger than an optimal imaging volume of the MRI system;

define a fixed slab with respect to the magnet to acquire MR data,

define readout in **a** [the] first direction;

acquire full MR data with frequency encoding in a direction of table motion, defined as z-direction, for a selected subset of the MR data acquired in at least one transverse dimension in the fixed slab;

continuously move the patient table while maintaining position of the fixed slab;

determine patient table position; and

repeat the acquire and determine acts while the patient table is moving until an MR data set is acquired across the desired FOV to reconstruct an image of the FOV". Appropriate correction is required.

41. This objected to **Amended Claim 16**, if rewritten as suggested by the examiner above, so that the steps have proper antecedent basis, is considered to be allowable over the prior art of record because the prior art does not teach or suggest the feature of acquiring "full MR data with frequency encoding in a direction of table motion, defined as z-direction, for a selected subset of the MR data acquired in at least one transverse dimension in the fixed slab," in combination with each of the other features of the claim.

42. **Claims 17-21** are considered to be allowable over the prior art of record because they each depend from **allowable Amended claim 16**. Therefore, the same reasons for allowance that apply to **allowable Amended claim 16** apply to **dependent claims 17-21** and need not be reiterated.

43. **Claim 24** is considered to be allowable over the prior art of record because it depends from objected to **claim 23**, therefore it includes the objected to feature of **claim 23**, which is not taught or suggested by the prior art of record.

44. The **prior art made of record** and not relied upon is considered pertinent to applicant's disclosure.

A) **Wang** US patent 5,928,148 issued July 27th 1999.

B) Yoshitome Japanese Laid-open Patent Application (kokai) No. H6-304153 disclosed November 1st 1994. [The examiner is using the English version of this reference provided by applicant and submitted with applicant's Information Disclosure Statement].

C) Yoshitome Japanese Laid-open Patent Application (kokai) No. H6-311977 disclosed November 8th 1994. [The examiner is using the English version of this reference provided by applicant and submitted with applicant's Information Disclosure Statement].

D) Machida US Patent Application Publication US 2002/0115929 A1 published August 22nd 2002 which has an effective filing date available under 35 U.S.C. 102(e) of September 21st 2001 is not available as prior art against the instant application because applicant's declaration under 37 CFR 1.131 effectively disqualifies the **Machida** reference as prior art, therefore the **Machida** reference is not prior art against the claims of the instant application.

E) The Dietrich et al., article "Extending the coverage of true volume scans by continuous movement of the subject" by Olaf Dietrich and Joseph V. Hajnal from The Robert Steiner Magnetic Resonance Unit, Hammersmith Hospital, Du Cane Road, London W120HS 1999.

F) Brittain US Patent Application Publication US 2002/0140423 A1 published October 3rd 2002, which is the corresponding publication of applicant's instant application, therefore this application is not available as prior art, but is noted only for the purposes of a complete record.

G) Brittain US Patent Application Publication 2003/0011369 A1 published January 16th 2003, which is the corresponding publication of applicant's co-pending continuation

application, 10.235,454 and therefore is not available as prior art, but is noted only for the purposes of a complete record.

H) Kruger et al., US patent application Publication 2002/0173715 A1 published November 21st 2002; filed November 26th 2001, with an effective US prior art date of April 9th 2001 from the US provisional application 60/282,555 filed April 9th 2001. This reference has been overcome by the sworn declaration of December 15th 2003 made by applicant, who has effectively sworn behind the April 9th 2001 date of the **Kruger et al.**, reference.

45. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

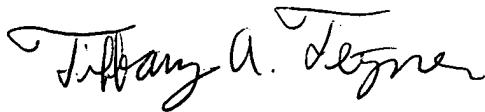
46. A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Conclusion

47. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Tiffany Fetzner** whose telephone number is **(703) 305-0430**. The examiner can normally be reached on Monday-Thursday from 7:00am to 4:30pm., and on alternate Friday's from 7:00am to 3:30pm.

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48. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, **Diego Gutierrez**, can be reached on **(703) 308-3875**. The fax phone number for the organization where this application or proceeding is assigned is (703)305-3432 .



TAF

3/7/04



Diego Gutierrez

Supervisory Patent Examiner

Tech Center 2800